Boosting productivity
Value-adding solutions for gear cutting
Value-adding coatings and services are the right choice for your gear cutting applications

More than ever before, gear cutting is being driven by reducing production costs per part, for which high productivity and reliability in the cutting process is key. High-performance coatings from Oerlikon Balzers, such as BALINIT® ALCRONA PRO and BALINIT® ALTENSA, allow higher cutting speeds and feeds in order to increase productivity in gear cutting, while new services such as primeGear and inShape improve cutting process reliability and help reduce both overall tool costs and costs per part.

Benefit from our gear cutting expertise

<table>
<thead>
<tr>
<th>Demands in gear cutting</th>
<th>Coating solutions from Oerlikon Balzers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase cutting parameters in gear cutting operations (e.g. for hobbing and gear skiving)</td>
<td>High-performance coatings such as BALINIT® ALTENSA and BALINIT® ALCRONA PRO and dedicated post-treatment</td>
</tr>
<tr>
<td>Variable chip thickness around the engaged cutting edge (e.g. for stick blades, skiving tools and hobs)</td>
<td>Tailored cutting edge radius and profiles with primeGear for different areas of the cutting edge</td>
</tr>
<tr>
<td>High impact stress on the cutting edge when entering the workpiece (e.g. for stick blades and shaper cutters)</td>
<td>Stabilised cutting edges by dedicated cutting edge profiles for specific processes and cutting parameters</td>
</tr>
<tr>
<td>Tight part tolerances and high tool value (e.g. for carbide hobs and broaches)</td>
<td>Smooth decoating of cemented carbide tools with inShape without affecting the tool profile</td>
</tr>
</tbody>
</table>

Hobs  
Stick blades  
Shaper cutters  
Skiving tools  
Broaches
Value-adding services for gear cutting

primeGear gives you higher process reliability, reduced tool wear, extended tool life and shorter cycle times, cutting production costs by up to 40%. Together with you we will eliminate the weak links in tool life by analysing all phases in the tool life cycle:

- Surface treatment
- Cutting process
- Tool handling
- Resharpening

primeGear – Adding value to your gear production

**Consulting & Optimisation**
- Process analysis and optimisation
- Analysis of tool wear and resharpening quality
- Tool inspection and quality control
- Analysis of tool life cycle and production costs

**Tailored tool treatment**
- Tailored surface pre-treatment
- Perfect edge preparation
- Optimum coating for the specific application
- Tailored post-treatment

**primeGear**
- Reduction of variations and down-time in production
- Maximum tool performance
- Part quality improvement
- Proven savings in production

inShape – gentle de-coating of cemented carbide tools

inShape from Balzers is an innovative process for reconditioning carbide tools without damaging the tool surface or losing its profile.

- Complex tools like hobs, broaches or skiving tools keep their profile shape
- Allows reconditioning of tools coated with BALINIT®, ALTENSA, LATUMA and PERTURA
- Reduces tool costs over a tool life cycle by up to 25%
- Smooth de-coating of cemented carbide tools without damaging the surface
- No profile grinding required over whole tool life cycle to retain tolerances

No profile grinding required over whole tool life cycle to retain tolerances

![Graph showing diameter reduction over number of reconditioning cycles](image)
Our coating solutions for high-end gear cutting

<table>
<thead>
<tr>
<th>Material</th>
<th>Hobs</th>
<th>Stick blades</th>
<th>Shaper cutters</th>
<th>Skiving tools</th>
<th>Broaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unalloyed steel</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel &lt; 1000 N/mm²</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel &gt; 1000 N/mm²</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Steel 45 - 56 HRC</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
<tr>
<td>Cast iron (GG, GGG)</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AT / AP</td>
<td>AP</td>
</tr>
</tbody>
</table>

AP = BALINIT® ALCRONA PRO  
AT = BALINIT® ALTENSA  
LM = BALINIT® LATUMA

Coating properties at a glance

<table>
<thead>
<tr>
<th>BALINIT®</th>
<th>Coating material</th>
<th>Coating hardness ( H_c ) (GPa)</th>
<th>Compressive stress ( \sigma_c ) (GPa)</th>
<th>Max. service temperature ( {^\circ}C )</th>
<th>Coating temperature ( {^\circ}C )</th>
<th>Coating colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCRONA PRO</td>
<td>AlCrN-based</td>
<td>36 +/-3</td>
<td>-3 +/-1</td>
<td>1,100</td>
<td>&lt; 500</td>
<td>bright grey</td>
</tr>
<tr>
<td>ALTENSA</td>
<td>AlCrN-based</td>
<td>40 +/-3</td>
<td>-2 +/-1</td>
<td>1,100</td>
<td>&lt; 500</td>
<td>light grey</td>
</tr>
<tr>
<td>LATUMA</td>
<td>AlTiN-based</td>
<td>35 +/-3</td>
<td>-3 +/-1</td>
<td>1,000</td>
<td>&lt; 500</td>
<td>grey</td>
</tr>
</tbody>
</table>

All given data are approximate values and dependent on application, environment and test conditions.
Outstanding results in challenging gear cutting applications

**Gear hobbing with primeGear**

- **Tool**: PM-HSS hob, Ø 100 x 300, module: 2.25
- **Workpiece**: Crown gear
- **Cutting parameters**:
  - 1st cut: 
    - feed: 3.7 mm/rev
    - cutting speed: 190 m/min
    - dry
  - 2nd cut: 
    - feed: 4.4 mm/rev
    - cutting speed: 320 m/min
    - dry
- **Source**: Automotive end user

**Gear skiving with BALINIT ALTENSA**

- **Tool**: HSS skiving cutter
- **Workpiece**: Worm gear shaft
- **Cutting parameters**:
  - Cutting speed: Confidential
  - Oil cooling
- **Source**: Confidential

**Gear hobbing with BALINIT ALTENSA**

- **Tool**: PM-HSS hob (S390), Ø 80 mm
- **Workpiece**: Steel 1.7174, AISI 4820, 20MnCr5, 570N/mm²
- **Cutting parameters**:
  - Test 1: 
    - cutting speed: 280 m/min
    - dry
  - Test 2: 
    - cutting speed: 320 m/min
    - dry
- **Source**: Automotive end user

**Face hobbing with BALINIT ALCRONA PRO**

- **Tool**: Carbide stick blade
- **Workpiece**: Crown gear
- **Cutting parameters**:
  - Cutting speed: 162 m/min
  - axial feed: 4 mm/min
  - Cycle time: 5.44 min
  - Wet
- **Source**: Automotive supplier, Brazil
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Canada
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USA

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Spain
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Singapore
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